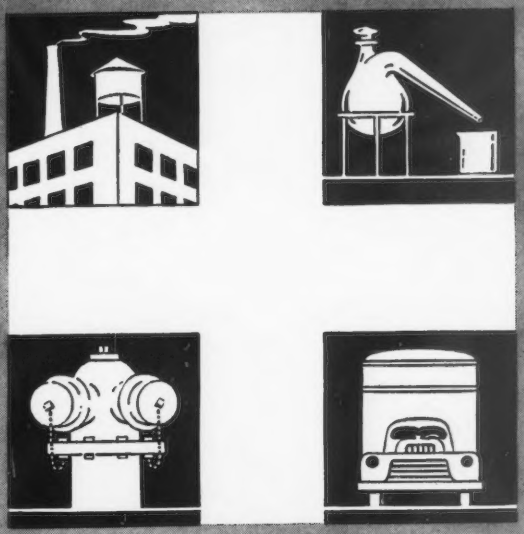
The Journal

OF THE AMERICAN SOCIETY OF SAFETY ENGINEERS



FEBRUARY, 1957

Volume II Number 1

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AMERICAN SOCIETY OF SAFETY ENGINEERS

Organized 1911 — Chartered 1915

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WE ARE proud to report that action of the Executive Committee at its October 20 meeting admitted three new chapters to the American Society of Safety Engineers, bringing the total to 64 chapters. The new chapters, with headquarters in Little Rock, Arkansas; Albuquerque, New Mexico, and Worcester, Massachusetts, are named, respectively, the Arkansas, New Mexico and Worcester County Chapters. An up-to-date listing of all Society chapters, with headquarters cities, will be found on the inside back cover of this issue . . . October 23 another highlight of the Society year was the Annual Meeting. Arthur S. Johnson, vice president of American Mutual Liability Insurance Company, was the featured speaker and H. William Heinrich was presented with a Certificate of Honorary Membership. Texts of Mr. Johnson's paper and Mr. Heinrich's acceptance speech are published on the following pages . . . Also of note in this issue is John V. Grimaldi's analysis of research studies dealing with "Noise and Human Safety" . . . And Eugene L. Newman's article discusses one of our Society's European counterparts, the German Association of Safety Engineers.—The Editor

Our President Speaks on SAFETY

IN YOUR activities, both professional and personal, do you show character?

Of course, "character" is a word with many formal —and several slang—definitions. But in my use of this rather overworked word I am referring to the possession of high mental and moral standards and, in addition, what one dictionary calls "notable or distinctive quality or qualities."

You, as a safety engineer, and your chapter of the American Society of Safety Engineers, as an organization of professionals in this important field of accident prevention, have a unique opportunity and a vital challenge to display this kind of character.

One incident which I observed showed something of the distinctive quality of character so valuable to a Society chapter.

I was privileged to attend a meeting of the Quebec Chapter in Montreal, Canada, and to present a Life Membership to that eminent safety statesman, Wills Maclachlan, 71 years old—or young—and still going strong for safety.

A simple ceremony at the beginning of the chapter dinner impressed me. I noticed that, as the members and guests seated themselves at the banquet tables, no one was smoking and there seemed to be an air of expectancy, of waiting for something more than the food which would be served.

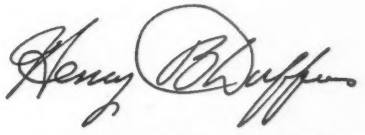
When the room was quiet the chapter general chairman, J. L. Noel, rose and proposed a toast to the Queen. This toast was followed by one to the President of the United States, out of respect for a number of guests from Canada's neighbor country.

I don't think it was my Scots inheritance that awakened my interest. To me the incident had great significance. It signified character and added a degree of dignity to the meeting. It earmarked the chapter and its environment. It established a mood especially appropriate for a meeting of a safety engineering society.

Many other chapters have practices of equivalent effectiveness. I know of a number that offer a blessing before dinner. Many open their business meetings with a prayer, as does the national Executive Committee. I hope all chapters, by their own methods, are developing similar character traits.

Certainly the opening of meetings with an expression of reverence to our leaders, both spiritual and governmental, is one positive measure to add to the natural dignity of a profession such as ours, dedicated as it is to the saving of human lives.

We must do much more, of course, to add substantially to the stature of the profession and the Society. As individuals and as chapters we must show the full development of our character by taking on, increasingly, the responsibility for accident prevention activities in our local communities. And above all we must hold fast to the principles in the Creed of the Safety Engineer and the Canons of Ethics of Engineers, which we have adopted as our guides.



Henry B. Duffus, President
American Society of Safety Engineers

A PIONEE

Honorary Member Suggests Interpretation of "Safety Engineering" Include Both Arts and Sciences of Accident Prevention

EDITOR'S NOTE: *A Certificate of Honorary Membership in the American Society of Safety Engineers was presented to H. William Heinrich (pictured at left) at the Society's Annual Meeting October 23, 1956, in the Grand Ballroom, Conrad Hilton Hotel, Chicago.*

Mr. Heinrich is the eleventh man ever to be awarded Honorary Membership, highest individual honor conferred by the Society. The certificate, which was presented by the Society's retiring national president, Edward B. Landry, reads, in part:

"In recognition of his services beyond the call of duty in the advancement of the arts and sciences of safety engineering and in the promotion of accident prevention, and as an expression of the high personal esteem in which H. William Heinrich is held by the members of the Society, we have elected him Honorary Member and have duly recorded his name on the record as such."

The acceptance speech delivered by Mr. Heinrich appears below. For a brief biography, see opposite page.

MR. PRESIDENT, officers, members and guests of the American Society of Safety Engineers, I am happy and delighted, honored and privileged to receive this evidence of respect and good fellowship. I am humble in the knowledge that you have placed me in so distinguished a group as John Roach, Daniel Harrington, Ned Dearborn, J. I. Banash, W. H. Cameron Sr., John J. V. Forbes, John Stilwell, C. H. Weiser, William P. Yant and our now departed friend, Sidney J. Williams.

Hackneyed as these expressions may be, I say them with utter conviction and the utmost sincerity, for this is not an ordinary occasion nor is the American Society of Safety Engineers an ordinary society. For me, the presentation of this Certificate of Honorary Membership in the Society is the highlight of 1956—in fact, the highlight of a lifetime.

With your permission I'd like to leave with you a thought and belief which I have long held. It relates to the future of the Society, to safety engineering and safety in all of its aspects.

The American Society of Safety Engineers is a relatively young society. So too is the safety profession itself. Yet our Society is both powerful and influential. It will grow and become even stronger and more influential. Measured as a crusade, its objectives have made remarkable progress but have barely heated the crucible of achievement.

My thought is that the concept of safety and that of our Society should be broader both in thinking and in action—broad to the point that safety becomes recognized as a distinctive profession, one comparable in publicly acknowledged achievement to medicine. Medicine, to be sure, deals with both prevention and cure but the emphasis in practice is largely on cure. Safety deals primarily with *prevention*. Nothing could be more important, more non-controversial than the prevention of accidents and of the deaths and injuries, the pain, grief and economic losses that accidents cause. The field in safety is wide open to the highest degree of research—technical research and that which deals with psychology.

Made Up of Safety Professionals

The American Society of Safety Engineers is more than a luncheon club, more than a group of persons who get together to share experiences and more than a gathering of persons who are merely *interested* in safety. Our Society is composed of people *who are actually and directly practicing the profession of safety.*

There is a great need for safety councils with their broad representation but there is even greater need for the "doers," the men and women who *practice* safety as well as preach it and who do their best to encourage others to think and to act in the interests of humanity and economy.

Our Society by name and by its constitution and by-laws has cheerfully accepted a tremendous national responsibility. There is no other comparable organization. The American Society of Safety Engineers of the near future, as I visualize it, will be the Mecca, the clearing house, the central source of information, of facts and of advice to all persons and groups concerned with the prevention of accidents. It will be looked to for constructive criticism and suggestions with regard to safety aspects in the design, construction, installation, inspection, operation and maintenance of structures, machines, tools, equipment, processes and procedures. It will be

LOOKS AHEAD

by H. William Heinrich

recognized as the source of factual data on both the unsafe personal attitudes and unsafe practices that permit or cause accidents, and on the most effective factors in safety organization, in management and supervision and in safety education and training.

Work of the nature herein described will not conflict with, but will aid, that of safety councils and other organizations because it *will be primarily technical.*

The gathering and dissemination of general data will be a natural corollary, of course, but promotional activity will be carried on in cooperation with organizations which have this as a major objective.

Goes Beyond Exact Sciences

As a registered professional mechanical engineer, I am proud to claim even a lowly share of association with so distinguished a group. As a matter of fact the safety field in which I am happy to be presently engaged, as chairman of the Uniform Boiler and Pressure Vessel Laws Society, is primarily one that deals with American Society of Mechanical Engineers code construction, which in turn features design, factors of safety and the quality and strength of materials. However, I see in safety an even greater opportunity. There is more, much more to safety than is encompassed in mechanical engineering—more than in chemical, electrical and civil engineering—more than in traffic, industrial management, construction, manufacturing, mining, agriculture and the home. The great residue, stated separately, lies in the education and training and finally *the control of unsafe personal* performance.

The American Society of Safety Engineers does not need to change its name but just to define it—and to broaden its concept of and application to the safety engineering profession.

The term "engineering" is already broadly defined in usage. A well planned and well conducted task is said to be "well engineered." The term "human engineering" is in common use.

Advocates Activity in Many Fields

So be it, my thought visualizes printed and spoken references to aspects of safety beyond mechanical engineering, and especially to *human* engineering. I see even a note or subtitle, a foreword and a heading on stationery, on bill heads and publicity material, that ties in human engineering with our Society. And I visualize, too, the formation of Society sections and committees of size that specialize in research and action, within the greater Society, on mechanical safety engineering, on the other sciences and arts and on the control of unsafe personal performance.

The members of the American Society of Safety Engineers carry on a distinguished and distinctive profession. The time is near when that profession will be so recognized nationally. An educational background is needed; I foresee the development of a special undergraduate curriculum leading to the degree of bachelor of science in safety and post-graduate progress to both master's and doctor's degrees.

In conclusion, may I again express from the heart my thanks to Retiring President Edward B. Landry, to the Executive Committee and to all members of the Society. And may I offer my sincere best wishes to our incoming president and officers and to the American Society of Safety Engineers for its continued growth and prosperity.

BIOGRAPHICAL NOTES: *H. William Heinrich is chairman of the Uniform Boiler and Pressure Vessel Laws Society Inc., a position he has held since his retirement in mid-1956 as superintendent of the Engineering and Loss Control Division, Travelers Insurance Company. He had been employed by Travelers since 1913.*

Mr. Heinrich has been a member of the American Society of Safety Engineers since 1924 and has been active in the affairs of the Society, serving for a number of years on the national Executive Committee and as chairman of several Standing Committees. In 1955 he was elected to a three year term on the Executive Committee as a national member-at-large. He is a member of the Society's Connecticut Valley Chapter.

Widely known for his research in the field of accident prevention, Mr. Heinrich is the author of four books and many magazine articles, including "The Accident Cause Ratio—88:10:2," which was published in the May, 1956, issue of the Journal of the American Society of Safety Engineers.

He has served as chairman and member of committees of the American Standards Association, has participated in many conferences and holds membership in a number of organizations, including the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, Veterans of Safety and the Casualty Council of Underwriters' Laboratories.

In 1952 Mr. Heinrich received two outstanding honors for his contributions to the safety movement, the Arthur Williams Memorial Medal from the American Museum of Safety and the Medal of the Conservatoire Nationale des Arts Et Metiers, *Paris.*

by

Arthur S. Johnson

Speaker Challenges Society Members To Advance Knowledge and Understanding in Areas of Exact and Social Sciences

STANDARDS of CONCERN to the SAFETY ENGINEER

EDITOR'S NOTE: *Principal speaker at the 1956 Annual Meeting of the American Society of Safety Engineers (held October 23 in the Grand Ballroom, Conrad Hilton Hotel, Chicago) was Arthur S. Johnson, vice president, Engineering, American Mutual Liability Insurance Company. The text of his address to the Society membership is published on the following pages.*

Mr. Johnson has been with American Mutual for more than 30 years and has a long and distinguished record of participation in safety activities. He serves as chairman of the American Standards Council, governing body of the American Standards Association, and is a member of the National Safety Council's Industrial and Traffic and Transportation Conferences and the National Association of Manufacturers' Health and Safety Committee.

THE American Society of Safety Engineers faces one of the most compelling challenges that can motivate any group of leaders in organized society. That challenge is to provide the engineering know-how and technique with which to operate the safety movement in the United States. The pressure comes from the cold, unvarnished and tragic fact that even in the year 1956 the annual price in death and injury for our American way of life is 90,000 dead.

Whether the challenge is a primary one or corollary to a more fundamental one, I am not sure. I think it is corollary. The more fundamental challenge is the American way of life itself, which we find easy to take for granted. Out of our comfortable and quite desirable high standard of living, either by ignorance, thoughtlessness, callousness or merely the lack of voluntary control, come these accidents.

Seeks Measurement of Success

Where are the criteria to be found which measure safety engineering accomplishment? We are not dealing here with engineering standards of dimensions or tests or safety codes. If I can justify taking your time to consider your own measures of objectives and methods and satisfactions, it must be to discuss them within the frameworks that provide the natural yardsticks. Let us examine control and see where that leads us.

Control has come to be a key word in our American language. We organize ourselves into every conceivable sort of society, collectively to control something. The word connotes many things. It carries more meaning of attaining an objective than of stopping something. Control generally means the procedure within a plan to achieve a result, together with the review and feedback to assure continuance of the plan. Control is used to describe actions that vary in acceptability all the way from "to be rebelled against" to "very desirable and much sought for." There is acceptance of the control of the sale of football tickets, but one reacts to the control implied by "police state."

The American miracle may be that we are achieving civilization by organized voluntary control more outside of government than within it, knowing that it couldn't possibly be attained under formal government controls alone.

Calls Safety Production Key

By mid-Twentieth Century in the United States the principles of production and distribution have succeeded in bringing us to such a high order of living, with the Bill of Rights still untrammelled, that control can be discussed objectively and in the public interest without suspicion of skullduggery or selfish motive. Thus the safety engineer can seek to put engineering methods into accident prevention realizing that safety is the biggest single control— still imperfect in its design and application—upon which the realization of the good things in American life depends. Never fail to remember that safety is not implicit in an automobile, lawnmower, frozen food, Colt revolver, etc., nor in their manufacture. Hazard is implicit in the manufacture and the use of each of these things. It is control that makes them safely and makes them safe to use.

And for these reasons I will try to bring your mind this morning to "Standards," the limit to which controls are integrated.

A standard is the criterion which measures the adopted way of doing something. It is "Standard" with a capital "S" when it is recognized by representative groups as the "best known way." Someone applies the yardstick and reads the measure. When the reading is within the tolerance permitted by the standard a good result is declared; the standard has been met. Let us then search out some standard, of interest to safety engineers, which can be used to evaluate their accomplishments when accomplishment may lie anywhere between "very ordinary" and "maximum usefulness."

In order that this might be more a report of an analysis, or better still, a reflection of your own opinions, I have put some questions to a couple of dozen first class safety engineers to see how standards stacked up in their minds. I am persuaded that among any number of frameworks with which safety engineering and accident prevention actions of all kinds might be placed, there are four which provide the important criteria. It will be my purpose to enumerate the four areas, discuss the nature of the standards which may be drawn from each and make some recommendations to the safety engineering profession generally and to the American Society of Safety Engineers. as its seat of voluntary control, in particular.

Names 4 Major Areas

The four areas of activity that subtend the safety engineer's objectives, actions and accomplishments seem to be:

1. The technical; that is, the factual, physical, transfer-of-energy area, limited by knowledge of the laws of nature reduced to their mathematical abstractions and expanded into the wealth-creating schemes that we call our industrial economy. That is a very large area, but it is the engineer's natural stamping ground and he understands its language.

2. The human relations area dealing with behavior of people toward each other. This is perhaps the most important to the engineer, because the purpose of all actions taken in the technical field is somehow or other for the benefit of people. Let us not be concerned in this discussion with the benefits that industry seeks, but limit our present interest in this area to providing a framework of human relationships and methods for their evaluation.

3. The intellectual, or the area of human endeavor that seeks knowledge for the vast array of benefits to be realized by culture in its broadest sense. I separate this from human relations as a whole area, not as a corollary, because knowledge as such—and the communication of ideas that spring from knowledge—as opposed to the display of reaction based upon inherited tendency or instinct, may be the means of differentiating between the useful man and the "warm body."

4. The spiritual, that vast area of human behavior and hope which marks the civilized man from the barbarian.

Reviews Technical Progress

Lest someone mistake my purpose for what may seem to be dragging some non-specific and non-concrete consideration into an engineer's job, which primarily translates ideas to things, let me hasten to assert that unless the material good qualities of the American scheme reveal the spiritual plane upon which all this adventure takes place, then surely the safety movement is crying in the wilderness.

Now let us take up, one at a time, these four areas of interest and search out the principles that underlie the standards.

In taking up the technical area, let us ask ourselves a question and explore it. "How are we doing?"

The safety movement as such is 50 years old and most of the significant results have come since the first World War. In that time accidents in occupations have been cut in half at least twice and in some industries as much as three times. The rate of producing highway accidents seems to have been cut. I don't know how much, but death rates have come down one-half, twice in 20 years. But—the gross national product has doubled twice, in dollar measures, since the depression. Real wages have doubled in 50 years when historically they have doubled in 300 years.

So we are compelled to ask ourselves, "Did the accident reduction come about through the actions of safety engineers in their staff positions, trying to engineer safety into jobs and to teach safe practices to people, or did the vastly increasing intelligence of management—in creating new and better ways of producing all our goods—include safer methods as a natural consequence?"

Credits Safety Engineers

Being an engineer I hasten to express my view that safety engineering did contribute its fair share toward the result, for I have examined dozens and dozens of situations in which the safety engineer provided the spark that made management pursue a safety course first that led to more profitable and better production later. The law of industrial safety supports this view; namely, that operating efficiency does not reach maximum until accidents have been reduced to minimum.

In the meantime things are happening. The rate at which mechanical aids will be added to man's usefulness to work, to produce and to manage to control production, beggar the imagination. There will be general acceptance when the benefits are revealed. There are already operating in industry jobs that are so complex and the setup so costly that the combined skill of the designing engineers, the industrial engineers, the production engineers, the safety engineers, the management from top to bottom and the workmen thrown in for good measure cannot predict with certainty that some given number of operations can be completed without accident. Yet the compelling objective from this day forth must be:

1. To visualize hazard and the means of an accident.
2. To predict successful operation with certainty.
3. To design the worker contribution to each task so as to fall within the physiological limits of the worker.
4. To establish "fail safe" controls.
5. To train hands to the degree that each understands his routine including what to do in every emergency and to make certain each understands the consequences of an accident.

Sees Need for Engineering

Let me charge one variety of safety engineer with a growing tendency to forget his real objectives. Too many are piddling with contests and accident records quarrels, settling for a safety committee meeting or a routine plant inspection, trying every means at their disposal to reduce the score of accidents except by engineering so that there will not be accidents. *Contribute your proper share of engineering skill to make operations safe or quit claiming to be engineers.*

The positive action called for from this day forth is best described by T. F. Hatch, in the spring of 1956 before the Western Pennsylvania Safety Conference (and elsewhere in the literature). His address on coordinating the human and mechanical factors in safety engineering is an important contribution to the current safety literature.

The principle which underlies engineering attention to any task is the principle of discipline. A task in any undertaking—casting an engine block, driving an automobile, operating a crane, providing the human factors in an otherwise automatic operation, anything—is subject to analysis and description. Every motion can be accounted for. The total of the actions define the routine or discipline for the task. The *discovery of the possibility of causing an accident* in each coordinated set of actions, machine and person, and changing the relative motions to remove the accident possibility, is the first step in safety engineering. The standard of performance which I recommend has three parts:

1. Understand the principles of mechanics that are involved.
2. Examine with understanding to the end that you approve each job instruction.
3. Demonstrate each faulty condition so that the job designer—either machine or task—can make the change you suggest.

This is *accident control* through *safety engineering* with *standards.*

If you think I am setting too high a standard, then you set a lower one that does not at the same time transfer the safety engineer's function to someone else. If it is so transferred you have worked yourself out of a job.

Tells Value of Human Relations

Let us now turn our attention to the area of human relations to see what standards principle that framework holds for the safety engineer. We must recognize that the second half of the safety engineer's job is to communicate his thoughts to others. Since he is discovering things that others are not aware of and trying to get right and willing action for the things he sponsors, he is essentially a teacher. His job is one of staff to the production line and to all the production and engineering staffs. Even in highway safety he is counselor to the citizen who is deciding where, when and how to drive his car.

It would seem that the job of communicating his ideas to others is simple. However, it is not. We are living in an age when people often do not heed what they are told, and the tendency seems to be to put the burden upon the teller rather than the listener. Getting along with people has taken the prominent place in the minds of industrial management and personality seems to be a more prominent topic of conversation among personnel directors and consulting psychologists than technical know-how.

Let this point be clear. If you are an engineer, there is no substitute for knowing what you are talking about. At the same time, any one of a half dozen unfavorable behavior patterns can and does effectively nullify all effort to communicate an idea and get right action. For example, the egotistical fathead and the immature, subjective, defensive person are not useful. While it is an engineer's natural inclination to be intolerant of people who have to be approached with baby talk and "pretty please," the fact remains that the engineer by his very breeding and his staff position has to put a premium upon his good relations with others. His natural operating policy of "I suit me," makes it imperative that he establish for himself an outgiving code of communication.

The principle that underlies satisfactory human relations is the principle of equal dignity. Ability to understand, intelligence, experience, education, technical visualization, etc., will vary but standards of communication between the safety engineer and all his pupils, from president to lowest grade of worker, will be proper if founded on the principle of equal dignity. In this connection, the job analyst task which I recommended in the chapter on technical activity is, in part, one of coordination between the various engineers, the personnel specialists and the psychologists. You better not start it if you can't control the personal equation.

Shows Importance of Education

Let me turn to the framework provided by intellectual considerations. It is classical to find fault with engineers of all kinds for their limited range of interests, especially those lacking an interest to acquire a better working skill in English. As a matter of fact I doubt such a limit. Introversion yes, but not lack of interests. It is also pointed out that the persons with strong aptitudes for executive management also exhibit the largest vocabularies, while many engineers appear to be inarticulate.

I have no intention of pursuing a course of criticism of my many friends who make up the profession in which I am placed and of which I am very proud. But I do wish to sound a note of warning that even now may be coming too late for some people. No longer is it possible to meet new situations off-the-cuff of one's own experience. Industries are sending executives and foremen to school, not just to learn the tools of management and the new techniques of production, but to broaden themselves especially in English and mathematics and in any other subject that is interesting to the individual and provides study disciplines.

It is proving to be necessary to do this in order to understand Twentieth Century methods and culture. It is providing the control by which people can listen with recognition and a capacity to absorb. Almost all the basic knowledge of natural functions that has been discovered has been reduced to mathematical abstractions and is on its way to industrial usefulness.

The crying need today is more basic knowledge to feed the insatiable appetite of the American people for more ease and comfort and culture. The search for new knowledge is in ferment in every university, foundation and research laboratory. The engineer will provide the trained mind that codifies the new knowledge into useful activities. The safety engineer must make certain that the opportunity for mistakes does not provide the accidents which injure or destroy. Hence for the safety engineer there is no recourse but to extend constantly his own cultural disciplines.

I do not refer to subscribing to the primers which tell the success stories of accidents prevented. Safety literature as it is now published offers no mental exercise to the safety engineer. What is needed are stimuli to intellectual pursuits for their own sakes, before we find ourselves unable to do anything but piddle with accident records and such trivia.

What is the standard in this area? That is hard to set down. During the early guarding-of-machinery days, say up to 1930, there were a great many good safety men who came from millwright and other shop supervision jobs. Those who have survived to now and are able to meet executive management face to face have improved the breadth of their learning to the equivalence of experienced, graduate engineers. They earn good salaries. Some of them continue to be the best in the business. Since the depression and the war, the standard of selection has risen to engineering graduate for admission to the profession, green, without experience.

While it is true that presently the research and production markets cannot find all the advanced graduate engineers they need, I hope to live to see the day when PhD's will find a challenge to their talents in safety engineering. Safety engineers are a dedicated crowd of humanists, and learned men with such lofty objectives can be happy in its activities. For the present generation, to whom more book disciplines might be difficult, I would say teach, read, study—formally or otherwise as best you are able—but do not stop learning things that are new to you.

Stresses Spiritual Dedication

Let us now explore briefly the spiritual area in which we will find the truly purposeful standards. Earlier I spoke of the acceptability of controls as those which were in the public interest as opposed to those that are essentially in support of selfishness. Selfishness is of course a quality of the spirit that motivates many actions. It is not one that is to be classed in the affirmative as providing benefit to all. To the safety engineer, spiritual values are truly objectives.

If a control leads to serenity, it is right. Without serenity, material benefits are as dust in the mouth. If the control leads to charity or compassion or tolerance, it is right. Courtesy as an artificial relationship between people is like armed peace—without trust. Courtesy which is the result of obedience to the truly spiritual motives of charity—compassion and tolerance, then self discipline, self control—reaches its highest standard. I am convinced that the material good things in our American scheme will carry us naturally to a higher spiritual plane; the hangover of viciousness in its various forms, requiring punitive controls, is a relic of barbarism.

There are no people who are dealing with the full range of practical and material things, whose actions are more motivated by humane objectives than safety engineers. It is in the humane objectives that they find the dedication which so strikingly marks some of them. The standards of performance that are truly significant are on the spiritual plane.

Now, briefly and in conclusion, permit me to recommend some things for your Society to ponder and take action on.

1. Find a way to give significance to your Committee on Research. Presently it appears to me that researchers in safety are happy with the discovery of a gadget. The engineering problem that research should be concerned with is the filling of the gaps of knowledge, and then communicating the new knowledge. Safety engineers need desperately the comprehension of the scientific and human facts coming into new use in industry. But they need that knowledge in advance of utilization having reduced it to handbook treatment.
2. Become a Safety Standards agency. In an earlier address I made this recommendation, and you already have made standardization an operating policy. I am not repeating now to be critical of your policy. I am critical of your performance. Lead—take the initiative—build a fire under this activity so that your Committe on Safety Standards may be inspired to seek the best way in all you future actions. You should continue to process your Standards program in the procedure of the American Standards Association, of course.
3. Examine your educational objectives and processes. To the extent that I understand them, they do not seek to make the most of safety engineering either as a chore in the plants or as a profession. I think they can try to inject a modicum of safety into all engineering. That is all well and good, but you should not permit a modicum for yourselves or your society.
4. Coordination of all interested parties and their action is the foundation of management. Coordinated action to bring about safety for all people is the final tactical plan of all the breeds of engineering involved, medical, physical and personal professions together with management as the coordinating influence. This is accomplished under the staff planning and direction of the safety engineer. In some companies the safety engineer has been made subordinate to others who do not know accident prevention. This may reveal professional weakness that can be overcome only by raising the professional skill and level of the safety man. Let there be a raising of the sights to the horizons that encompass the whole safety problem and envision the full scope of the accident prevention method. My recommendation is to do it informally by such as this address, and formally by committees to study all your excuses for existence and improve them.

Charts Course for Society

In this address I have undertaken to report to you how some responsible safety engineers look upon standards as applied to themselves and to their own performance. I have of course enlarged upon their views in an effort to give you, as the professional society of safety engineers, some notion of the direction toward which your problems will lead you in the predictable future and what your actions should be to become sufficiently capable to meet the problems at levels of performance that justify the concept of "Standard."

Yours is a noble cause and your standards are necessarily on a high spiritual plane. Living on a spiritual plane will always provide all the adventure and danger that you can plan for and control.

Review of Studies Shows Noise Effect on Communications, Psychological Factors Establishes Relationship between . . . .

NOISE and Human Safety

by John V. Grimaldi

RECENT health and safety literature has pointed up the possibility that exposure to certain sound pressures can result in hearing loss. Although the clinical and experimental evidence is clear concerning the possibilites, there are many complicating variables. These have been described and should be familiar to all who have given some study to the matter. There may be other ramifications of the noise and safety relationship, however, which may be greater in extent, if not in significance, than those immediately concerned with the loss of hearing. For example, communications interference and psychological effects have been identified with the noise-safety problem.

Noise and Hearing Losses

Perhaps it would be worthwhile to review first the variables complicating the hearing loss problem as the first step in examining the noise-human safety relationship and the uncertainties surrounding it.

Aging is responsible for some of the difficulty. It is presumed that the deterioration of hearing among certain older people is a part of the aging process. But it has also been surmised[1] that the noises of everyday life may be accountable.

Temporary losses are another complication. It has been observed[1,2,3] that measured hearing losses associated with noisy environments may be improved following removal from the noise source. The recovery may continue for as long as six months to a year and raises the question of whether the hearing losses reported related to noise may have followed measurements of defects that would have dissipated somewhat with rest.

Related effects of noise frequency and intensity must be considered. The identification of a noise merely in terms of its sound pressure level will not necessarily indicate the possible damaging effects of the noise. Early investigators reported only the noise level for the environment under study, without indicating the weighting network or reference pressure used. The usual sound-level meters indicate the sum of the sound pressures* over the range of sound frequencies. Therefore, for a noise having present all audible frequencies at equal sound pressure levels, the overall sound pressure level may be considerably higher than for any one frequency band of the noise. Further, there is increasing acceptance that the disturbing effects of noise may be expected to vary directly with both intensity and frequency.[1,4,5,6]

The preventionist, trying to identify the noise-hearing loss factors and their degree of involvement, has even more to consider. The procedure used and the conditions present when evaluating the noisy environment or the hearing loss of the individual might give improper results. On the other hand, illness may be responsible for hearing loss resembling that which may be caused by noise.[7] It is possible, too, that the noise situation in the shop may vary over the years as processes are changed and machines replaced. Also, individual susceptibility to hearing loss due to noise varies. False conclusions, therefore, may be derived.

The complications are heightened when consideration is given the attempts to establish criteria for hearing damage. Sterner[6] conducted an interesting questionnaire study of 275 professionals concerned with establishing a safe-limit for noise levels. The replies recommended maximum levels ranging from approximately 60 to 105 decibels. An interesting indication of the spread of opinion is seen in the reproduction of Sterner's plot of the replies, Figure 1. A recent authoritative report[8] indicates that noise levels between 90 and 100 db, particularly in the speech frequencies, should be the limit for continuous exposures, to prevent hearing damage.

Speech Interference

The masking effect that noise has on communication can be another, but different, safety problem. Inability to understand instructions or working signals in noisy places aggravates hazardous situations and may otherwise reduce efficient performance. There are a number of methods for indicating the sound level at which voice

**The American Standard for Sound-Level Meters specifies that the instrument be designed with three frequency response characteristics, which are obtained by "weighting" networks, designated A, B, C and also known as "40 db," "70 db" and "flat," respectively. It is when the flat frequency response is used that a meter measures "sound pressure levels." When measurements are made with the weighting networks, the meter is said to register sound levels. The accepted reference pressure is 0.0002 dyne/sq. cm.*

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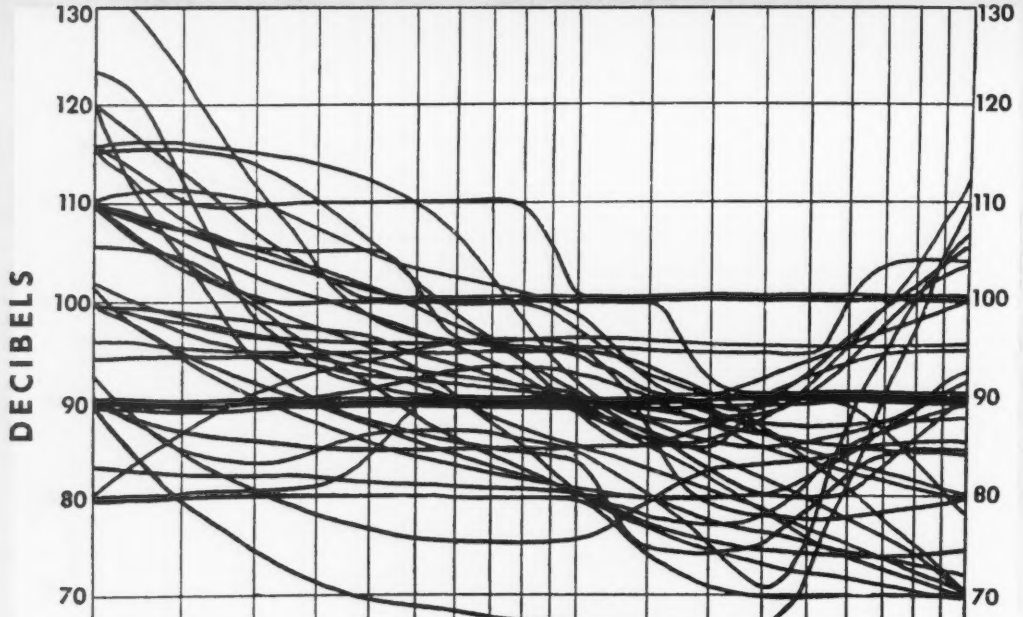

Figure 1—Estimates of "Safe" Frequency-Intensity Levels

NOISE AND HUMAN SAFETY *Continued*

communication becomes difficult. One[9] is frequently used in engineering problems. In this method the sound pressure noise level is determined in the frequency bands: 600-1200, 1200-2400 and 2400-4800 cycles, using an octave band analyzer and sound level meter. The arithmetic average for the three levels is then computed. This average is known as the "speech interference level" and is expressed in db, re: 0.0002 dyne/sq. cm. Figure 2,[10] is a table indicating the maximum speech interference level for a listener at various distances from the voice source.

A noise level above 89 db would make a *shouted* conversation difficult across a distance of six inches from the listener. This level, then, would be the maximum tolerable if voice communication were to be accomplished. It is interesting to consider that 89 db—the maximum speech interference level—is close to the suggested level for hearing damage prevention. In other words, a noisy environment that is controlled with respect to the needs for voice communication will not be apt to cause hearing losses.

Psychological Effects

It is probable that noise has some psychological influence on man and that there may be some relationship to safe performance. Many studies have been made to explore the general area of psychological effects attributable to noise, but most have been poorly controlled, resulting in questionable data.[11, 12]

Control Problem

There is always a problem when constructing an experiment which is intended to explore the influence of a certain factor—for example, noise—on the behavior of people. Since the experiment generally is of short duration and uses a small sampling of the population, extraneous factors may contaminate the data unless there are proper controls. For example, such factors as the following should be considered for delimitation: humidity, illumination, age, physical letdown or the feeling of not being able to perform at one's best, hearing acuity, vision acuity, learning, experience, capacity and status. The usual uncertainty that is associated with the results of experiments concerned with behavior, therefore, must be greater. Nevertheless, the principal studies are of interest and do have value as markers along the road to our eventual understanding of the noise-behavior relation.

An early investigation[13, 14] was concerned with the work performance of weavers. The looms created a noise level of about 96 db.* The experiments first had

**In this and many other studies, the reference level for db is not expressed, but it seems likely that 0.0002 dyne/sq. cm. was used.*

a group of weavers wear ear plugs on alternate weeks, which reduced the intensity 10 to 15 db during those periods; then the weavers were divided into two groups of ten, equated according to past efficiency, and one group wore ear plugs while working for six months. The other group serving as a control did not; finally, the second experiment was repeated using some different subjects but extended over a period of one year. The results of the three experiments were roughly the same, indicating approximately a 12 per cent average increase in efficiency for those who wore the ear plugs.

Unanswered Questions

However, the results raise questions which can not be answered by examination of the experimental technique. For example, as the experiment was ending, the results of the experimental and control groups came closer together. It might be surmised that this was because the motivation or added interest from being a subject began to wane, affecting the production results. Indeed, the subjective reports of some of the subjects indicate an approval of the experiment and an interest in helping its progress. It has been shown[15] that such attitudes can significantly affect work output. A criticism reported in the literature[16] noted that the equality of the experimental and control groups in the first and second experiments was never demonstrated. The first experiment's results were suspected also by the investigators because of a difference in humidity between the weeks worked with ear plugs and when ear plugs were not worn.

The principal field study done in America has never been published in its entirety, but representative reports have appeared in several places.[17, 18, 19] Semi-monthly records of bonus awards to typists, clerical checkers, punchcard and comptometer operators were kept by the Aetna Insurance Company for one year prior to and one year after the offices were treated with sound absorbing materials. Initially the sound levels were about 41 db, and 35 db after the treatment. The results stated were a 52 per cent reduction in calculating machine operators' errors, 29 per cent reduction in typists' errors, employe turnover reduced by 47 per cent and a "health improvement" of 37.5 per cent.

Due to a scarceness of pertinent facts it is difficult to criticize this study, but the results appear to be extraordinary if attributable to sound reduction alone. One wonders whether in the two years allowed for the study there may not have been some improved worker efficiency through learning, the deficient may have been discharged or transferred, the quality of supervision may have improved, and so on.

Inconclusive Results

The results are somewhat deemphasized by a control study made a year later. The sound absorbing media were covered with gypsum board, raising the noise level six db. It was found immediately thereafter that the bonus efficiency dropped to some extent, but not as low as the first year. However, within two months it was as high as for the "quiet" year.

One study[20] reported the effect of a distracting noise upon reaction time to various stimuli. For noise, an anvil was struck by a hammer and the noise was present (a) continuously during both reaction and rest periods for one series of tests; (b) continuously, but only during the reaction periods for another series; (c) intermittently, but only during the reactions for a third series. The results showed the distractor may lengthen and also shorten the reaction or it may become habitual and have no effect at all; its effect is dependent upon the conscious attitude of the subject during the distraction and "upon the temporal relations of the distractor;" it is most resistant to habituation when intermittent.

Analyzing this study, there seems to have been no attempt to control the experiment with regard to the other variables that may have had an effect on its results, namely temperature, humidity and the feeling of fatigue or lassitude. This study is typical of most of the early studies[21, 22, 23] on the effects of noise in that it deals with reaction time.

One study[24] investigated the effect of the steadiness and pitch of a noise stimulus on a coordination task. An "experimental factory" was established employing four workers, two at a time, who inserted an electric stylus in the holes of a moving tape and contacted a conducting plate. The holes were small, irregularly shaped and spaced. Performance was recorded by electric counters, while the "workers" did their task under conditions of frequency variations from 64 cps to 4096 cps and noise levels from 50 db to 70 db. The work period was four and one-half hours each day and lasted three months.

Noise, Performance Variations

Individual results or daily records were not presented, but it is stated that data for days that were "humid" or "hot" and "when one of the subjects felt indisposed" were not included. It was found that complex, steady noises had a more adverse effect on the "production" performance than pure tones of equal intensity, with the exception of tones above 2048 cps. From 512 cps upward, each increase in frequency preceded a further loss in production. Further, the more intense the noise, the greater the initial decrease in performance. Reduction in noise levels was followed by increase in output, with a greater gain noticed for reductions from the more intense levels. An intensity drop of five per cent from 70 db was followed by a three per cent reduction in errors.

It was stated that as a precaution against the subjects not being accustomed to the noise, the results for the louder noises were gathered last in the course of the experiment. This procedure may be considered to impugn the results, for it is likely that a subject's motivation can well decrease during the run of a three month experiment.

A later investigation[25] was reported, concerning the effect of diverse atmospheric and noise conditions upon output, feelings and physiological functions during the performance of various tasks roughly analagous to operations found in the plotting and charting rooms of naval vessels. Six subjects were chosen to meet the physical requirements of the U.S. Navy and for homogenous grouping with regard to age, education and general intelligence. The noise sourve was an electric ventilator fan developing noise levels of 72, 80 and 90 db. A relatively large group of experimental tests were used (i.e., discrimeter, mental multiplication, number checking, type-

writer code test, locations test, pursuit and attitudes tests, pulse rate and oral temperatures, and the Hull Engine Lathe Test).

The study would seem to have been well controlled and its results, which showed that performance of the tasks employed were not adversely affected, are acceptable if one does not question the unfortunately small sample. The study, however, did not consider the effect of, nor report the frequencies of, the noises used. This limits the value of the information in the light of present suspicions concerning the possible influences of noise frequency as well as intensity.

Aircraft Noise Tests

Tests conducted with "military" noises to determine their effect on psychomotor efficiency were carried out during World War II. A study[26, 27] simulated aircraft noise, and its spectra (frequency range) and intensity were measured. Five subjects, for seven hours per day, four days a week through four weeks, performed various tasks requiring decision and coordination under conditions of "quiet" and "noise," and their performance and reaction time were recorded.

The results of one of the tests showed there was a slower average response time and errors were more numerous in the presence of noise. However, in general there seemed to be no difference in performance for the tests conducted in the noisy vs. the quiet condition. It was noted that the "quiet" condition for some of the experiments was noisier than the "noise" condition for many other of the experiments performed. This may or may not have had a significant effect on the results.

Part III of a report edited by Waring[28] reviewed this study and divided the results into those that gave inconclusive results and those that showed no effect from noise. It was concluded from the review that airplane noise has no or, at the worst, but slight detrimental effect upon motor coordination, reaction time, sensory perceptions and certain mental functions even after exposures lasting several hours. However, all the subjects reported they preferred "quiet" and tended to feel fatigued and irritable after working in "noisy" surroundings.

Another experiment,[29] paralleling a military situation, examined the effects of loud sounds on the accuracy of azimuth tracking and stereoscopic range finding with a device for gunfire control. Subjects were exposed to phonograph recordings of such sounds as air raid sirens, exploding bombs and airplanes. The results showed that, in general, noise did not affect performance. Although in one of the tests noise adversely disturbed performance, subjects adapted themselves fairly promptly. This may have been due to the fact that the nature of the test task was automatized.

One recent interesting study[30] did not investigate the relationship between noise and neuro-muscular performance. A sample group of 35 college students and a control group of 34 were administered number checking, name checking and form board tests. Subjects were motivated by cash prizes to achieve productivity. The scoring method heavily penalized a "hit or miss" performance. The 10 best scores received the largest cash prizes. The experimental group was subjected to a noise stimulus having a level of 100 $\pm$ 2 db and whose spectrum ranged from 100 cps to 3000 cps, except for a rise of 7 db in the region of 150-300 cps, and 4 db in the region of 2500 cps. The experiment consumed 30 minutes for each group, with the period of quiet equal to the period of noise during the noise condition. The experimental sound was the thermal noise of a continuously conducting gas triode, fed to an amplifier and heard through two loud speakers. Bursts of sound ranged in length from 10 to 50 seconds.

The results, although not immediately pertinent to the study under consideration in this report, showed that the effect, upon short term mental performance, of bursts of intense noise is to increase the quantity and decrease the quality of response; but the effects were of such magnitude as to be practically negligible. It would have been interesting if the experimenter had attempted to determine whether there were any comparative differences in response at varying sound levels and frequency ranges. Apparently the study was not delimited to subjects with normal hearing.

A recent investigation described in a British report[31] employed a series of steam pressure gauges lined along three sides of a square. The subject stood in the center of the open end of the square and was instructed to observe and correct any pointer which exceeded the danger mark. The pointer signals were presented at random and the test runs were 90 minutes long. Ten subjects participated, each for five days, and were exposed in the sequence—quiet, quiet, noise, noise, quiet. Noise levels for quiet were 70 db, and noise 100 db re: 0.0002 dyne/sq. cm. The results indicated that subjects performed more poorly (about 33 per cent) on the noise days than on the quiet days preceding and following. When the task was made simpler (the dials were replaced by lights whose brilliance was sharply intensified at random as a signal) another group of ten subjects showed no significant effect of noise.

Biological Effects Survey

Recently a study team of scientists cooperated in a program to survey existing information on the biological effects of noise and to conduct preliminary experiments. Their work has been published in a document identified as the "Benox Report"[32] which covers physiological and psychological aspects of the problem.

One member of the team reported on a series of investigations conducted with small groups of subjects (four to six volunteers) under noise conditions provided by a jet engine with and without its afterburner in operation. Noise levels close to 140 db (re: 0.0002 dyne/sq. cm.) were recorded when the afterburner was operating (this level existed for intervals of only a few minutes duration), and 128 to 135 db (which was the more frequent noise level) was considered the "quiet" period. Subjects wore ear protectors which were reported to have acoustic insulation properties ranging from 26 db to 40 db for low and high frequencies, respectively.

The general results of the series of tests indicated that the high noise exposure had an adverse effect on the subjects' performances. In a two hand test where subjects were required to compress, with their hands, two dynamometers joined back to back, it was deducted

that the total output of the right and left hands was decreased two per cent and that the subjects as a group did not or could not conform to instructions, i.e., "squeeze both hands at once as hard as you can," under the high noise condition as well as in "quiet."

Reaction Time Study

In a test requiring the subject to assemble 27 varied colored blocks so that when assembled the blocks formed a cube with the same color paint facing on one of its sides, it was noted that the subjects experienced an increase in the amount of the time required to complete the assembly during the noise condition rather than an anticipated decrease expected as the result of practice. In a test of reaction time required to perform a function following the receipt of a visual signal it was concluded by the investigator that "the effect of intense noise on such simple behavior as reaction time will vary widely according to individual differences." For a two hand coordination test which was conducted in two parts, with a deviation of conditions for the second part, data was produced which indicated in general that coordinated acts were slower and/or more clumsy during noise and that there was a tendency to perform hastily in the presence of intense noise.

The investigations published in the British and Benox reports regrettably employed too small a sample to establish statistical significance. Also, there was no reported attempt to control such variables as environmental factors which may influence the performance of subjects.

Another recent study,[33] as yet unpublished, explored the possibility of a noise and neuro-muscular response relationship. Attempts were made to carefully control the experiment, which consisted of exposing 52 subjects to 28 recorded sounds. The noises varied between 70 and 100 db (re: 0.0002 dyne/sq. cm.) inclusive and occurred in the octave bands 75-150, 150-300, 300-600, 600-1200, 1200-2400, 2400-4800, 4800-9600 cycles per second. The sounds were mixed in order of presentation, were interspersed with intervals of quiet.

The subjects performed a task requiring hand-eye coordinated movements. It consisted of driving a stylus around an eccentric pattern, by turning two crank handles on a device similiar to the compound slide rest of an engine lathe. The subject's performance was measured for noise and quiet exposures, in terms of response time, errors committed, production and precision.

It was found that response times and numbers of errors increased during exposure to these intermittent noises and that the relationship was statistically significant. Production and precision tended to be reduced in the presence of the noise. Exposure to noise in the upper frequencies (particularly 2400-4800 cycles per second) and at levels of 90 and 100 db tended to produce the slower response times and greater number of errors.

A survey of 23 nationally prominent safety specialists was made to determine if certain factors intrinsic in the experiment might be related to accident causation. It was found that there were implications which indicated that noise might have an adverse effect upon safe work performance, particularly with respect to slowed response time and an increase in the number of mistakes committed.

Noise and Safe Performance

There is some evidence, in addition to the preceding study's results, to indicate that noise may have an influence on safe performance. For example, speed of response and accuracy of performance have been reported[34, 35] to be related to accident causation. An unfavorable relationship between noise and speed and accuracy of performance has been indicated by a number of research studies.[24, 26, 33] The earlier investigations did not attempt to identify the frequency or sound level of the noises used. One,[33] however, indicates that sounds above 90 db and in the 2400-4800 cycle band may have the more pronounced effect. This is somewhat supported by the findings of a study[36] on the annoyance values of interfering noises. It reported that the more annoying frequencies were those above 2000 cycles.

With respect to the effects of steady and intermittent noises, it may be summarized that experiments which were conducted with a reasonable degree of precision indicate that steady or expected noises do not adversely affect psycho-motor activity to any degree of significance. In a large number of environmental situations, however, noises are neither steady nor expected.

In many respects, it seems, the effects of noise depend largely on the individual differences of people—what is music for one man may be disturbing for another. But

Figure 2

Speech Interference Levels for Normal Speaking Voice

Distance from Listener (ft.)	0.5	1.0	2.0	3.0	4.0	5.0	6.0	12.0	24.0
Speech Interference Level (db)	71	65	59	55	53	51	49	43	37

there appears to be a place of commonality that exists for controlling the harmful and annoying effects of noise. When the speech interference levels, damage risk criteria and annoyance values are considered, it is seen that noise levels which approximate 90 db become critical. The maintenance of an environment to control sound pressures for one of these factors should bring improvements in the others as well.

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VEREIN DEUTSCHER SICHERHEITS-INGENIEURE

Official emblem of VDSI, above, is symbolic of members' watchfulness over industrial activity.

German Association of Safety Engineers, Young Professional Society, Works Successfully To Advance Accident Prevention Goals

by Eugene L. Newman

VEREIN Deutscher Sicherheits-Ingenieure (VDSI) stands for the German Association of Safety Engineers. The aim and purpose of the association is the futherance of occupational safety, particularly through the exchange of technical experiences. The association is non-profit and devotes all income from dues and contributions to the furtherance of the objectives.

The VDSI was organized on May 24, 1951, at Koenigswinter on the Rhine River. It was first called the Work Association of Safety Engineers. The organizers were 80 safety engineers from various West German industries. The work of the association was to be in close cooperation with official safety control boards such as the *Berufsgenossenschaft* (Occupational Union), *Zentralstelle fuer Arbeitsschutz* (Central Office for Work Protection), *Bundesinstitut fuer Arbeitsschutz* (Federal Institute for Labor Protection), *Werkaerztliche Arbeitsgemeinschaft* (Medical Labor Office), *Verein, Deutscher Revisionsingenieure* (Union of German Revision Engineers), *Verein Deutscher Ingenieure* (German Association of Professional Engineers) and other organizations, as well as research laboratories.

During the remainder of 1951 the association continued to develop. In 1952 the founding members held a meeting in Siegburg, Germany, adopted Statutes of Organization and made plans for the future growth of the association. At that time the membership was 200.

The association grew substantially in membership and influence throughout the Federal Republic during the years 1953-54. In order to strengthen the position of the association and give better service to the membership, the association was reorganized in 1954 and became the VDSI. At present the membership totals more than 550, of which number 25 are Americans.

In 1952, when the European Federation of Safety Engineers was established in Brussels, Belgium, the VDSI joined this organization and has contributed a great deal to the advancement of the European Federation.

VDSI now has 14 chapters. Additional chapters are planned as the association grows. The territorial areas of the chapters generally conform with the boundaries of the lands (states) in Germany such as Bavaria, Hesse, Hannover and Rhineland-Pfalz. Meetings are held bimonthly at various locations—usually at member plants —such as Opel Motor Works (General Motors in Germany), Phoenix Tire Corporation (Firestone), I. G. Farben Chemical, MAN Diesel, etc.

Each chapter is required to hold, in addition to its regular meetings, a public meeting at least once a year to which people interested in occupational safety are invited. These include acquaintances of members, scientists, public officials, etc. The purpose of the special meeting is to acquaint the general public with the aims of the organization, its current activities and plans—and to create an interest in safety for all people.

Also, an annual conference is held nationally, which each year has grown in size. The VDSI, in conjunction with the Federal Institute for Labor Protection, the Medical Labor Association, the Association of Professional German Engineers, the Central Office for Accident Prevention and other organizations, now participates in an annual meeting called the Congress for Work Protection and Medicine. In 1955 the congress was held in Munich with a registration of more than 2,000.

The annual dues for the organization are 24 marks, or the equivalent of approximately $6.00. There are no chapters dues. A portion of the annual dues is given to the local chapter for operating expenses. Other portions of the dues are utilized to publish monthly a section

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in the *Aufklearungsblaetter fuer Arbeitsschutz* (Bulletin for Work Protection). This section is very similar to the Journal of the American Society of Safety Engineers in method of publication and in purpose. Other services to members include a yearly roster of members and monthly newsletters from the various chapters.

The requirements for membership are as follows:

To be a Full Member, a person must be chief of his company's safety organization.

To be the equivalent of the Associate Member classification of the American Society of Safety Engineers, the VDSI member must work as a technician or specialist in safety.

In addition, there is provision for a supporting membership, very similar to our Society's standard for Affiliate Member. There is no Junior Member classification.

The VDSI is governed by an Executive Committee consisting of a chairman, three vice chairmen, a secretary-treasurer and the chairmen of the 14 chapters. VDSI has no managing director, such as our Society, and no paid staff. All officers serve voluntarily and without compensation. The 1955-56 chairman of VDSI is Hans Steeg of the Mannesmann Iron Plants Inc., Duisburg-Huckingen, Germany. Mr. Steeg also serves as a vice president of another professional organization of which the VDSI is a member, the *Federation Europeene des Associations d'Ingénieurs de Sécurité et des Chefs de Sécurité* (FEAICS or the European Association of Safety Engineers).

A close working relationship is maintained between VDSI and the *Verein Deutscher Ingenieure* (German Association of Professional Engineers). The VDI is very similar in nature to America's National Society of Professional Engineers. The VDSI also cooperates fully with the technical safety inspectors who are employed by Germany's federal government and who correspond, in their duties, to safety inspectors from our various state labor departments.

Community activities of the various VDSI chapters vary with the locale. In some areas chapters work closely with local traffic safety officials, although the association's membership does not include any traffic safety personnel. (There is a separate organization, the *Bundesverkehrswacht* or the German Traffic Safety Council, to cover traffic safety activities.) In addition, VDSI chapters work closely with the small plants in their areas which do not employ full time safety personnel, and offer these small industries the services of the chapter members as consultants.

Many members are working as delegates of VDSI on many federal boards or projects. One of the major projects is the development of protective equipment. Recently, through the efforts of VDSI, the German Federal Republic passed laws regulating machine guarding, providing for minimum guards, etc. VDSI can feel proud that it helped in formulating this law.

Basically, VDSI's program is divided into three phases —technical, social and organizational.

The technical phase includes assistance when planning machinery and equipment, checking of new equipment, safety inspection, personal protection, hygiene, etc.

The social phase concerns assistance in equipping the work area, instruction of newly hired employes, training of supervisors, information, education, medical care.

The organizational phase consists of reporting of accidents, instruction sheets, accident investigation, safety administration, staffing, etc.

The VDSI in banding together has provided a coordinated effort toward the common goal in safety—accident prevention. While VDSI is not as large as the American Society of Safety Engineers, and does not have our Society's many years of tradition and experience to draw upon, it is making a very valuable contribution in Germany toward this universal goal of the safety movement.

Safety in Germany has been a road of many forks. Small groups and even individuals have been pursuing their separate paths. VDSI is consolidating these efforts and getting everyone concerned to work as a team.

VDSI President Hans Steeg, who directs the safety program for the Mannesmann-Steelworks Corporation, has been in safety work since 1936. He was one of the founders and first chairman, in 1951, of the Labor Community of Safety Engineers (ASI).

National officers, chapter chairmen (pictured at right) form Board of Directors of German Association of Safety Engineers (VDSI).

Chapters of **AMERICAN SOCIETY OF SAFETY ENGINEERS**

ALABAMA
Birmingham, Alabama

ARKANSAS
Little Rock, Arkansas

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Shreveport, Louisiana

BOSTON
Boston, Massachusetts

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Peoria, Illinois

CENTRAL INDIANA
Indianapolis, Indiana

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Syracuse, New York

CENTRAL OHIO
Columbus, Ohio

CINCINNATI
Cincinnati, Ohio

COLORADO
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Wichita, Kansas

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Worcester, Massachusetts

AMERICAN SOCIETY OF SAFETY ENGINEERS

Membership Information

THE American Society of Safety Engineers has established the following classifications of active membership:

MEMBER—To be eligible as a Member an applicant shall be at least thirty years of age and shall be engaged in safety engineering. In addition, he shall have either an engineering or science degree in an accredited college curriculum and the equivalent of eight full years' experience in safety engineering; or he shall have had the equivalent of ten full years' experience in safety engineering.

ASSOCIATE MEMBER—To be eligible as an Associate Member an applicant shall be at least twenty-five years of age and shall be engaged in safety engineering. In addition, he shall have either an engineering or science degree in an accredited college curriculum and the equivalent of three full years' experience in safety engineering; or he shall have the equivalent of five full years' experience in safety engineering: or he shall have either an engineering or science degree in an accredited college curriculum, ten years' experience in professional engineering work and one full year's experience in safety engineering; or he shall have twenty years' experience in engineering work, of which at least ten have been at the professional level, and one full year's experience in safety engineering.

JUNIOR MEMBER—To be eligible as a Junior Member an applicant shall be at least twenty years of age and shall be engaged in safety engineering work, which if pursued the required time will tend to qualify the applicant for the grade of Associate Member. In addition, he shall have either an engineering or science degree in an accredited college curriculum or he shall have had the equivalent of one full year's experience in safety engineering.

AFFILIATE MEMBER—The Society also provides a special classification, that of Affiliate Member, for those not professionally engaged in safety engineering. To be eligible as an Affiliate Member an applicant shall be at least twenty-five years of age and shall have contributed to the advancement of safety engineering through demonstrated achievement in some related field of interest in which he has been engaged for at least three years.

for additional information write to

The American Society of Safety Engineers
425 North Michigan Avenue
Chicago 11, Illinois
(or contact your local chapter)